

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

an active layer comprising a semiconductor film comprising silicon, said active layer containing a catalytic element for promoting crystallization of said semiconductor film; and

a gate electrode comprising a heat-resistant material adjacent to said active layer with a gate insulating film interposed therebetween,

wherein source and drain regions formed in said active layer contain said catalyst element than other regions in said active layer.

2. The device according to claim 1, wherein said heat-resistant material is tantalum or a material mainly comprising tantalum.

3. The device according to claim 1, wherein said catalytic element is nickel.

4. The device according to claim 1, wherein concentration of said catalytic element in said source and drain regions is higher than the concentrations in said other regions by two or more orders of magnitude.

5. The device according to claim 1, wherein concentration of said catalytic element in a channel region of said active layer is less than  $5 \times 10^{16}$  atoms/cm<sup>3</sup>.

6. The device according to claim 1, wherein said catalytic element is selected from the group consisting of Fe, Co, Ni, Ru, Rh, Pd,

Os, Ir, Pt, Cu, and Au.

7. The device according to claim 1, wherein said gate electrode has a heat-resistance to a heat treatment of 550-700°C.

5 8. A method of fabricating a semiconductor device comprising the steps of:

forming a semiconductor film comprising crystalline silicon and containing a catalytic element for promoting crystallization of said  
10 semiconductor film;

forming an active layer of a thin film transistor by patterning said semiconductor film;

forming a gate electrode adjacent to said active layer with a gate insulating film interposed therebetween;

15 introducing phosphorus into regions in said active layer using said gate electrode as a mask, whereby source and drain regions of said thin film transistor is defined; and

performing a heat treatment at a temperature of 550 to 700°C to getter said catalytic element in said active layer into the  
20 regions introduced with phosphorus,

wherein said gate electrode has heat-resistance to the heat treatment.

9. The method according to claim 8, wherein material of said  
25 gate electrode is tantalum or a material mainly comprising tantalum.

10. The method according to claim 8, wherein said catalytic element is nickel.

11. The method according to claim 8, wherein said catalytic element is selected from the group consisting of Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, Cu, and Au.

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12. The method according to claim 8, further comprising a step of irradiating laser for said source and drain regions after said heat treatment.